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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/743,496	12/23/2003	Chih-Cheng Wang	3319-0111P	7781

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EXAMINER	
SMITH, NICHOLAS A	
ART UNIT	**PAPER NUMBER**
1742	

DATE MAILED: 08/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/743,496	WANG ET AL.	
	Examiner	Art Unit	
	Nicholas A. Smith	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☒ Claim(s) *11-12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/21/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

Claims 1-12 remain for examination.

Claim Objections

Claims 1-12 are objected to because of the following informalities: claims 1-12 are not written in idiomatic English, making them difficult to comprehend. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Bacon et al. (4,466,864).

In regards to claim 1, Bacon et al. discloses a fountain-type electroplating apparatus (Fig. 3) with an electroplating tank (**36**) located in an overflow tank (**56**) with an exit hole (bottom of **56**). The electroplating tank has a shell (**46**) with a cathode electrode (**74, 34**) arranged on top of shell, a mesh shape anode (**61**) arranged on bottom. Bacon et al. discloses a flow rectification device including a hull (**46**), a

separating plate (**43**) under the mesh anode, a pipe connecting to the hull (Fig.3, pipe leading to **36**) to transport electrolyte (**49**), wherein the separating plate (**43**) has at least a hole (**48**) and is connected to the hull (**46**).

Claims 1 and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Peace (US Patent 6,544,391).

In regards to claim 1, Peace discloses a fountain-type electroplating apparatus (Fig. 1) with an electroplating tank (**48**) located in an overflow tank (**46**) with an exit hole (bottom of **34**). The electroplating tank has a shell (**46**) with a cathode electrode (**36**) arranged on top of shell, a mesh shape anode (**52**) arranged on bottom. Peace discloses a flow rectification device including a hull (inner surface of **48**), a separating plate (**58**) under the mesh anode, a pipe connecting to the hull (**68**) to transport electrolyte, wherein the separating plate (**58**) has at least a hole (**60**) and is connected to the hull (inner surface of **48**).

In regards to claim 5, Peace disclose a baffle (Fig. 1, the piece directly above pipe inlet (**68**) that creates a flow rectification (Fig. 1, arrows from (**68**) to (**60**)) and at least two strut connecting to the separating plate (**58**).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being obvious over Bacon et al.

In regards to claim 2, Bacon et al. discloses a shielding ring (**62**) on top of a mesh anode (**61**). While Bacon et al. does not specify a shielding ring size, given the size of a typical semiconductor wafer plating apparatus it would have been obvious to one of ordinary skill in the art to select an optimum size for the shielding ring.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peace in view of Uzoh et al. (US Patent 6,658,814).

In regards to claim 2, Peace does not teaches a shielding ring on top of a mesh anode (**52**).

Uzoh et al. discloses an electroplating apparatus that includes a shielding ring (**62**) located above an anode (**4**) (col. 3, lines 59-61). While Uzoh et al. does not teach a mesh anode, a baffle (**8**) located above the anode is employed to provide flow rectification as the mesh anode is designed to do. It would have been obvious to one of ordinary skill in the art at the time of invention to modify Peace's electroplating apparatus with Uzoh et al.'s shielding ring in order to prevent direct flow to the edge of the thin metal film to be plated (Uzoh et al., col. 3, lines 59-67).

Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peace or Bacon et al. in view of Mori et al. (US Patent 5,496,463), Tremaine (US Patent 6,183,195), Lees (US Patent 4,497,345), Bergervoet et al. (US Patent 5,596,152) and Uzoh et al. as evidenced by Lytle et al. (US Patent 5,391,285), Peace or Mori et al.

In regards to claims 3-6, Peace and Bacon et al. do not specifically disclose separating plates with inclines of 5-40°, a separating plate with a plurality of orifices

extended toward the top of the pipe, a baffle with struts, or a disperser with a plurality of orifices along with an agitator and guiding plate.

It is well known in the art that uniform flow of electrolyte towards to the plating surface is highly desirable (Lytle et al, col. 2, lines 1-10 and lines 28-31; Peace, col. 3, lines 9-29; and Mori et al., col. 4, lines 45-67). Devices such as baffles and struts (Mori et al., col. 8, lines 18-45), impellers (Tremaine, col. 4, lines 45-49), inclined plates (Lees, Fig. 5, (**20**) and col. 1, lines 34-65), plurality of holes (Bergervoet et al., Fig 1. and claim 1) and dispersion plates (Bacon et al., Fig. 3, (**43**); Peace, Fig. 2, (**62**); and Uzoh et al., Fig. 1, (**8**)) are well know to impart uniform flow. Therefore, it would have been obvious to one of ordinary skill in the art to modify Peace or Bacon et al.'s apparati with flow rectifiers (Mori et al., Tremaine, Bacon et al., Lees, Bergervoet et al., Peace or Uzoh et al.) to achieve uniform flow of electrolyte and thus a uniformly plated workpiece (Mori et al, col. 8, lines 38-45). In regards to claim 4, it would have been obvious to one of ordinary skill in the art modify Peace or Bacon et al.'s apparatus with Lees' inclined plate and Bergervoet et al.'s plurality of holes to make flow even more uniform. It would have been obvious to one of ordinary skill to select an orifice diameter in the claimed range as a matter of choosing an optimum size based on flow space geometry (Bergervoet et al., abstract). In regards to claim 6, it would have been obvious to one of ordinary skill in the art modify Peace or Bacon et al.'s apparatus with Bergervoet et al.'s plurality of holes and Tremaine's impeller to make flow even more uniform.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bacon et al. or Peace in view of Shamouilian et al. (US Patent 6,432,282) and Olgado et al. (US Patent 6,802,947).

In regards to claim 7, Bacon et al. or Peace do not teach a plurality of joints on the circumference of the mesh shaped anode and the substrate.

Shamouilian et al. teaches a plurality of contacts (**56**) on the circumference of a substrate (**48**). Olgado et al. teaches a plurality of contacts on the anode extending into the electrolyte solution (claim 4). While Olgado et al.'s anode is not specified as a circular piece, it would logically be circular to match the substrate (**122**). It would have been obvious to one of ordinary skill in the art to modify Bacon et al.'s or Peace's apparatus with Shamouilian et al.'s and Olgado et al.'s plurality of contacts in order to enable deposition of reliable and consistent conductive metallic layers on wafers (Shamouilian et al., col. 2., lines 26-32 and Olgado et al., col. 2, lines 9-33).

In regards to claims 8 and 9, Shamouilian et al. and Olgado et al. teach at least three contacts spaced by an angle of about 80-160 degrees (Shamouilian et al., col. 2, lines 26-32 and Olgado et al., claim 4).

In regards to claim 10, positioning contacts of anode and substrate complementarily to each other would be an obvious choice in order to reduce non-uniformities.

Allowable Subject Matter

Claims 11-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 11-12 are allowable over prior art for the following reasons:

- Bacon et al. and Shamouilian et al. teach power supplies (Bacon et al., Fig. 3. and Shamouilian et al., Fig. 3). Bacon et al. teaches a switching point (Fig. 3). Shamouilian et al. teaches a plurality of detection circuits (Fig. 3) that include resistors and current sensors, but not resistors and voltmeters in parallel. Olgado et al. inherently teaches a plurality of connecting line from anode contacts to positive electrode of a power supply (claim 4). None of the prior art teaches employing a switch to have the first contact point (of three contact points) on the substrate alternatively operating with either the positive or negative electrode of the power supply.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicholas A. Smith whose telephone number is (571)-272-8760. The examiner can normally be reached on 8:30 AM to 5:00 PM, Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571)-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NAS

Harry D. Wilkins, III
Primary Examiner
AU 1742